PHASOR-BASED CONTROL FOR SCALABLE SOLAR PV INTEGRATION

by

Alexandra “Sascha” von Meier
Department of Electrical Engineering and Computer Science
University of California – Berkeley

Monday, October 21 • 11 AM – 12 PM • ETRL 101

OVERVIEW

This talk will present a new paradigm for controlling distributed energy resources on the basis of direct phasor measurements on the distribution circuit. Phasor-Based Control (PBC) is presently being developed at UC Berkeley with DOE ENERGISE funding (DE-EE 0008008). In PBC, resources adjust real and reactive power injections to maintain a target voltage phasor difference (magnitude V and angle δ) between a pair of locations. We propose a hierarchical architecture, where one or more layers of supervisory control compute phasor targets at specific nodes, and local controllers drive resources to track phasor targets. This allows us to explicitly prioritize local network constraints over economics and separates the tasks of disturbance rejection (faster) and optimization (slower), regardless of solar penetration level. The presentation will discuss the rationale for PBC along with early simulations, hardware-in-the-loop testing, and challenges.

BIO

Alexandra “Sascha” von Meier is an adjunct professor in the Department of Electrical Engineering and Computer Science and directs the Electric Grid Research program at the California Institute for Energy & Environment (CIEE) at UC Berkeley. She is also a faculty scientist in the Grid Integration Group at the Lawrence Berkeley National Lab. Her work is driven by the vision of a nimble and resilient electricity infrastructure that recruits intermittent renewable resources, energy storage and electric demand response to support a carbon-neutral energy sector. Among other research efforts, she has led an influential ARPA-E project to develop high-precision micro-synchrophasors (μPMUs) for distribution systems. Sascha was previously a professor of Energy Management & Design in the Department of Environmental Studies and Planning at Sonoma State University. She holds a B.A. in Physics and a Ph.D. in Energy and Resources from UC Berkeley.